The Journal of Emergency Medicine, Vol 15, No 6, pp 789–791, 1997

0736-4679/97 $17.00 + .00

ELSEVIER

PII S0736-4679(97)00186-8

Clinical Communications

THE FLEXIBLE BATON TM-12: A CASE REPORT INVOLVING A NEW POLICE WEAPON

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☐ **Abstract—The purpose of this case report is to describe a new type of police weapon and the injuries sustained by an individual after being shot with it. The Flexible Baton is a type of ammunition that consists of a fabric bag, filled with lead shot pellets, that is shot from a shotgun. It is predicted that this bag may cause bruising, abrasions, and blunt trauma. In our patient, the fabric bag burst and the pellets penetrated the skin of the elbow, resulting in cortical violation of the distal humerus. As more guns with this ammunition have been introduced throughout the United States, we conclude that injuries from this weapon will be seen with greater frequency. © 1997 Elsevier Science Inc.**

☐ **Keywords—flexible baton, nonlethal, police weapon, ballistics**

INTRODUCTION

In the past several years, new weapons have been designed and deployed to police officers in urban cities. The impetus has been to provide nonlethal alternatives in subduing and restraining violent or intoxicated individuals. We report the case of the first individual in Los Angeles injured by the Flexible Baton-TM 12. In addition, we describe this weapon and its ballistics so that predictions can be made of its ability to cause injury.

CASE REPORT

A 33-year-old intoxicated male was found on the street early in the morning combative, violent, and swinging a machete at anyone who approached him. To apprehend the individual, officers shot at him three times with the Flexible Baton. The patient was struck on the right hip, the left elbow, and left flank. He was taken to an outside community hospital where he received tetanus toxoid, 1 g of cefazolin intramuscularly, and was transferred to the Los Angeles County/University of Southern California Medical Center.

On arrival to the Emergency Jail Service, the patient complained of pain in the left elbow, right hip, and left lower ribs. Initial vital signs were: blood pressure 122/66 mm Hg, respirations 18 breaths/min, pulse 74 beats/min, and oral temperature 36.1°C. Physical examination revealed a 7 × 7 cm abrasion over the lower left ribs and tenderness to palpation in the left upper quadrant with no peritoneal signs. There was a 4-cm deep laceration over the left elbow posteriorly without active bleeding. Sensation and motor function to the left hand were intact. Left hand pulses were 2+, with normal capillary refill. There was an area of ecchymosis over the right hip, but no crepitance and full range of motion with normal motor function and strength. The neurological examination was normal except that the patient was agitated and combative.

The patient had four stable hematocrits over a 24-h period. The upright chest X-ray study was normal. A left elbow and humerus X-ray study showed five metallic pellets in the area of the distal humerus with cortical violation (Figure 1). There was no free air or metallic pellets within the elbow joint.

The patient received gentamicin (100 mg) and cefadyl (2 g) intravenously for the cortical violation. Orthopedic surgery was consulted for the left humerus cortical vio-

RECEIVED: 12 August 1996; FINAL SUBMISSION RECEIVED: 28 January 1997;
ACCEPTED: 18 February 1997

Figure 1. Humerus cortical violation.

lation and a saline arthrogram was recommended to rule out an open left elbow joint. The patient refused this procedure and instead underwent irrigation and drainage of the wound with loose closure. Prophylactic ciprofloxacin was given for 3 days.

Trauma surgery was consulted for possible intra-abdominal injury. Because of the unknown potential for blunt trauma with this ammunition, the patient underwent a computed tomography (CT) scan of the abdomen and pelvis, which was normal. The patient was discharged to the county jail the next morning after tolerating liquids.

Four days later, the patient was brought back to the Emergency Department for follow-up. He complained of pain to the left upper abdominal area and paresthesia to the left third, fourth, and fifth digits. There was pain to palpation with slight crepitance at the abrasion site. The left elbow sutures were intact with a small area of surrounding erythema. The sutures were cut and 5 mL of serosanguinous fluid were retrieved. The patient had full range of motion of the left elbow without pain. The orthopedic service was reconsulted and a saline arthrogram was performed without extravasation of fluid, although the procedure was terminated after 10 mL of saline at the patient's request. The wound was irrigated and left open to close by secondary intention. An X-ray study of the left ribs showed a nondisplaced eighth rib fracture (Figure 2). The patient's hematocrit was unchanged. The patient was discharged on Cephalexin (Keflex) orally for 1 week with a follow-up appointment in the orthopedics clinic. At 17 days after the injury, the patient showed good healing with full range of motion, but still with a subjective loss of sensation to the

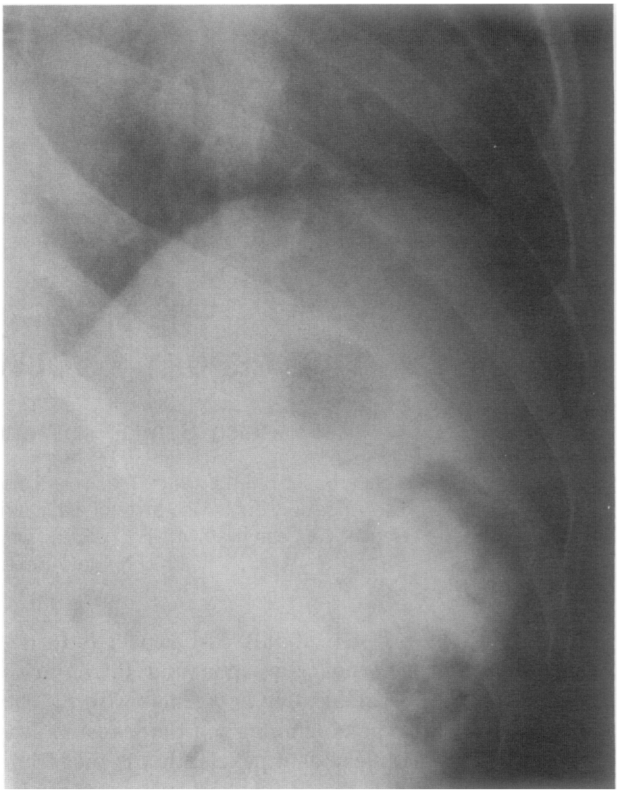

Figure 2. Nondisplaced eighth rib fracture.

fourth and fifth fingers of the left hand. He was discharged with wet to dry dressings and lost to follow-up.

DISCUSSION

Over the past few years, there has been an increased need for nonlethal intervention by law enforcement agencies to apprehend and subdue violent individuals. Currently, officers carry Tazer guns, pepper spray, revolvers, and batons. Alternatives are being developed that will be effective enough to arrest the actions of the person en-

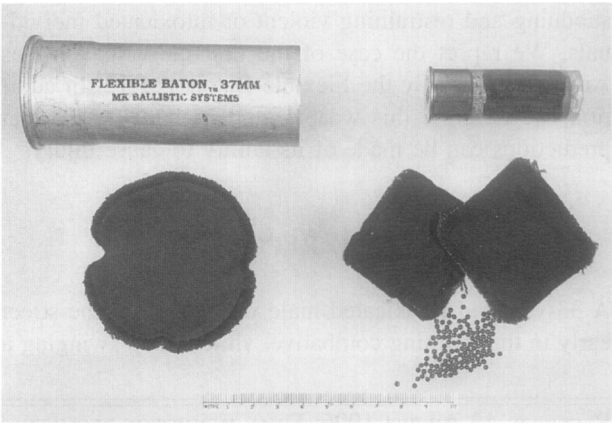

Figure 3. Flexible baton TM-12.

gaged in combative behavior and yet have a low probability of lethality. The Flexible Baton TM-12 was developed to be an effective deterrent without posing significant threat to life or causing permanent injury.

The manufacturer markets the Flexible Baton TM-12 for riot control, corrections facilities, and the apprehension and control of violent or hostile individuals. The ammunition consists of a 2-inch square fabric bag filled with lead shot and weighing about 40 g (Figure 3). With the Flexible Baton Tm-12-close range, a green fabric bag is used that has a projectile velocity of 230 feet/s and the kinetic energy is 70 feet/pound at the muzzle (specific energy 17.5 feet/pound/in^2, assuming the bag is completely expanded). The recommended range is 10–50 feet. With the Flexible Baton TM-12-Standard, a red fabric bag is used with a projectile velocity of 300 feet/s and the kinetic energy is 120 feet/pound (30 feet/pound/in^2). The recommended range is 30–100 feet. This blow has been described by the manufacturer as being approximately equivalent to a line drive from a baseball that has a kinetic energy of 41 feet/pound at 20 feet (Keith and Cuadros, unpublished data).

On impact, the bag collapses, causing the shot to act as a fluid medium that distributes the kinetic energy over 4 in^2. To meet the goal of low lethality, this system was designed to be capable of delivering high kinetic energy or momentum and distributing it over a large target area. Because the human body is irregularly contoured, it was felt that the impacting projectile must be deformable so that the energy delivered would be distributed uniformly over an impact area (Dettling and Mawhinney, unpublished data). As the fabric bag is launched from a 12-gauge shotgun, it rapidly expands and stabilizes so that the largest presented area is normal to the velocity vector (Dettling and Mawhinney, unpublished data).

Although the ammunition was first developed in the early 1970s, human description of injury is limited in the clinical literature. The possible morbidity and mortality of this weapon was estimated by parametric analysis, mathematical models such as the calculation of a severity index and anatomical considerations. Animal testing occurred using Texas angora goats; however, extrapolation from the animal model to humans is difficult to make because of structural differences, different geometry and strength of rib and bone structure (Dettling and Mawhinney, personal communication).

Roberts (unpublished data) performed extensive research with this ammunition on anthropometric crash test dummies. He inserted accelerometers into the heads and chest cavities of the dummies and then fired the stun gun ammunition with differing weights. He concluded that the ammunition was able to deliver a high-intensity, short-duration force over the entire surface of the bag. For head injuries, he surmised that the primary effects would be localized deformation and laceration. His results did not indicate sufficient acceleration force to produce intracranial injury. He anticipated only local tissue damage with blows to the chest. The forces documented in his study were not of sufficient duration to cause cardiac or pulmonary damage. Roberts was unable to assess abdominal trauma because there are no published data regarding the tolerance of the abdomen (Roberts, personal communication).

The cranium surrounding the brain, because of different thicknesses, has different tolerances to blows. The temporal area is the weakest section, requiring only 550 psi to produce a fracture. A low impact projectile is reported to yield average pressure of only 200 psi, which is below the force required to produce a skull fracture. However, additional tests cited using gelatin-filled human skulls apparently demonstrated the possibility of skull fracture with impacts over the temporal region (Dettling and Mawhinney, personal communication).

The liver and spleen are probably vulnerable organs if impact occurred directly over them (1). It is hypothesized that clothing would reduce delivered impact. Officers are therefore encouraged to shoot at the extremities, if possible, avoiding head, neck, and thoracic areas and to use the weapons only at recommended ranges. The highest morbidity and mortality would be predicted if the weapon is used at very close ranges with a frontal impact to the upper part of the target's body.

CONCLUSION

In our case, the patient sustained a left eighth rib fracture. Because the ammunition was able to produce a rib fracture, we conclude that it is able to cause visceral injury to the spleen and liver. In addition, the fabric bags apparently can burst open if striking a bony prominence, allowing the lead pellets to penetrate tissue. The full potential for injury from this weapon will not be known until its effects are studied in a large case series.

This case illustrates some of the injuries that can occur with the Flexible Baton-12. To delineate the full potential for injury, we need to gather data on all further injuries by this weapon. We have begun collecting all cases that present to our Emergency Department so that a large case study can be compiled.

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